#### www.EcoSenseInt.com



# The US EPA defines "Green Chemistry" as any product or process which reduces toxicity to the environment.

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Enhance Aerobic Activity

Absorb Heavy Metals

Lower COD / BOD

**Promote Oxidation of Organics** 

Designed to improve the quality of *Static or Inter-Event Stormwater*, Vault-Ox<sup>®</sup> is a proprietary blend of two active ingredients and will:

- Improve Dissolved Oxygen
- Immobilize Phosphorus
- Elevate and Buffer pH
- Absorb Nitrogen

A Source of Alkalinity:

- Increases the formation of calcite and apatite, increasing the phosphorus binding capacity of calcium.
- Prevents acidification of water when sulfides are oxidized
- Reduces free H2S concentrations
- Counters acid rain

A Source of ion exchange absorption / adsorption:

- Removal of Ammonia produced by aerobic digestion
- Removal of Heavy Metals from solution
- Effective in the absorption of Mercury, Arsenic, chromium, copper, lead, zinc, cobalt, nickel, barium, antimony



# Vault-Ox®

# **EcoSense International** Simple Solutions to Water Pollution

## Vault-Ox<sup>®</sup> alters the static stormwater environment.

Many pathogenic bacteria are strict anaerobes. Fecal/Coliform bacteria are typically facultative anaerobes. The static water found in underground drainage/ storage structures quickly becomes anoxic/anaerobic, lacking or completely absent of oxygen. At neutral pH Vault-Ox<sup>®</sup> releases oxygen and calcium, improving DO, elevating and buffering pH:  $2CaO_2+2H_2O \longrightarrow 2Ca(OH)_2+O_2$ 

At lower pH, Vault-Ox<sup>®</sup> dissolves faster and produces increasing amounts of hydrogen peroxide:  $CaO_2+2H^+ \rightarrow Ca^{2+}+H_2O_2$ 

Peroxide generated leads to a number of beneficial reactions: Oxidation of Sulfides; Fenton oxidation; Fe2+ Oxidation

 $H_2O_2 + OH^- -> H_2O + HOO^-; 2H_2O_2 -> 2H_2O + O_2; H_2O_2 + FE^{2+} -> HO$ 

<u>Marino and Gannon, 1991</u> Tested storm drain sediments during dry weather periods and found "Extended bacterial survival in sediments to survival in water...FC and FS in sediments remained stable for up to 6 days (the maximum inter-storm dry period)".

GPI Southeast, in the Final Report – <u>Baffle Box Effectiveness Monitoring Project</u>, <u>2010</u> reports "net exports of fecal coliforms and anaerobic conditions..." and suggest "probable causes for FC growth in baffle boxes are the interevent anaerobic conditions..." and point out "...use of any water storing box can lead to increased FC counts to water bodies".

### Introducing SSRC: Static Stormwater Remediation Chemistry

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Addition of Vault-Ox<sup>®</sup> with natural Z-100 have desirable selective ion exchange and absorption properties that be

used in the removal of:

- Ammonia from wastewater/stormwater
- Heavy Metals from industrial process, waste and stormwaters
- Effective in the adsorption of aluminum, antimony, arsenic, barium, cadmium, chromium, colbalt, copper, iron, lead, magnesium, manganese, mercury and nickel
- Enhanced oxidation of sulfides
- Enhanced oxidation of heavy metals
- Enhanced oxidation of pyrites producing sulfuric acid and Fe<sup>3+</sup>
- Fe<sup>3+</sup> becomes available for phosphorus immobilization

GRASS AND LEAF DECOMPOSITION AND NUTRIENT RELEASE STUDY UNDER WET CONDITIONS, Strynchuk, Royal and England, 1999. Reported "the majority of organic-based pollutants, which leach from grass clippings and leaves into water will be released within 1 to 22 days...BOD peaked at 9 days...most of the phosphorus was released in the first day...".

Vault-Ox<sup>®</sup> infusion module, *pictured above.* Vault-Ox<sup>®</sup> can be inexpensively retrofitted into any storm water structure or retention pond



Treatment Done after 15 days of Incubation 140 CaO2 120 Aeratio Anovic 100 80 P (µg/L) 60 40 10 20 25 Time (Days) Zhang et al, Water Science & Tech., 50, 173 (2004 Retention Pond - 6 Weeks **Retention Pond** Later EcoSense International before treatment  $2lb/acre.ft CaO_2 + Enzymes$ 

